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APPLICATION FOR LETTERS PATENT

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Location-Based Web Browsing

Inventor(s):
Michael C. Koss

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1 **RELATED APPLICATIONS**

2 The present application is a continuation of U.S. patent number 09/106,819,
3 attorney docket number MS1-238US, filed on 6/29/98 and entitled "Location-
4 Based Web Browsing".

5
6 **TECHNICAL FIELD**

7 This invention relates to mobile Web browsers, and to the utilization of
8 GPS-generated geographical information in conjunction with such Web browsers.

9
10 **BACKGROUND OF THE INVENTION**

11 Automobile "stereos" are gradually being replaced by more complex
12 components that have numerous capabilities in addition to the capabilities of
13 playing music from over-the-air radio broadcasts and from tapes and CDs. For
14 example, automobile accessories are being designed that incorporate such features
15 as cellular telephones and Internet connectivity. A US Patent Application entitled
16 "Vehicle Computer System," filed by Microsoft Corporation on November 29,
17 1995, having serial number 08/564,586 (hereby incorporated by reference),
18 describes one such automobile accessory. Generally, many systems such as this
19 are similar to desktop computers, with added multimedia capabilities and other
20 capabilities related to the automotive environment.

21 Mobile automobile computers sometimes incorporate hardware for
22 determining the absolute geographical position of the computer or automobile.
23 Currently, this is accomplished using a positioning receiver that receives satellite
24 transmissions and processes such transmissions to determine geographical
25 coordinates (such as longitude and latitude). The system currently in use is

1 referred to as the Global Positioning System (GPS) and is maintained by the
2 government of the United States. Low cost receivers are available for use with
3 various types of mobile computers.

4 The most obvious use of positioning capabilities is in conjunction with
5 mapping software. Thus, application programs have been developed for showing
6 a user's current position on a scrolling map and for providing driving instructions
7 to a driver based on the driver's current position and a specified geographical
8 objective.

9 Location data can be exploited even more effectively when a mobile
10 computer also has Internet access. When this is the case, geographical data can be
11 provided by Internet servers and can therefore be drawn from a much larger
12 database.

13 In addition to these uses of real-time location data, however, the inventors
14 have realized a need and an opportunity for automatically providing mobile
15 Internet users with geographic-specific information as part of their normal Web
16 browsing activities.

17 18 **SUMMARY OF THE INVENTION**

19 In accordance with the invention, a client's Web browser is configured to
20 include location data in its HTTP requests. The responding server takes note of
21 the location data and customizes its returned content in accordance with the user's
22 location. Optionally, the server also returns a valid zone indication, indicating an
23 area within which the returned content is valid. Upon leaving this area, the client
24 automatically resubmits its request to obtain new information appropriate for the
25 new user's location.

1 The invention effectively customizes a user's Web browsing experience
2 based on his or her physical location, without requiring any special steps on the
3 part of the user. In addition, the user does not need additional application
4 programs such as have been needed in the past. Rather, the work of finding
5 appropriate data is transferred to Web servers.
6

7 **BRIEF DESCRIPTION OF THE DRAWINGS**

8 Figs. 1 and 2 show a mobile computer and network system in accordance
9 with the invention.

10 Fig. 3 is a flowchart illustrating methodological aspects of the invention.
11

12 **DETAILED DESCRIPTION**

13 **Hardware Environment**

14 Figs. 1 and 2 illustrate a mobile computer and network system in
15 accordance with the invention. In the described embodiment, the invention is
16 implemented at least in part with computer-executable instructions, such as
17 program modules, that are executed by a mobile computer that is particularly
18 adapted for the automotive, handheld, or other mobile environments. Generally,
19 program modules include routines, programs, objects, components, data structures,
20 etc. that perform particular tasks or implement particular abstract data types.
21 Moreover, those skilled in the art will appreciate that the invention may be
22 practiced with other computer system configurations, including hand-held devices,
23 multiprocessor systems, microprocessor-based or programmable consumer
24 electronics, network PCs, minicomputers, and the like.
25

1 An exemplary system for implementing the invention includes a mobile
2 computer 20, including a microprocessor or other processing unit 21, a system
3 memory 22, and a system bus 23 that couples various system components
4 including the system memory to the processing unit 21. The system bus 23 may
5 be any of several types of bus structures including a memory bus or memory
6 controller, a peripheral bus, and a local bus using any of a variety of bus
7 architectures. The system memory includes read only memory (ROM) 24 and
8 random access memory (RAM) 25. A basic input/output system 26 (BIOS),
9 containing the basic routines that help to transfer information between elements
10 within computer 20, such as during start-up, is stored in ROM 24. Computer 20
11 optionally includes a hard disk drive 27 for reading from and writing to a hard
12 disk, not shown, a magnetic disk drive 28 for reading from or writing to a
13 removable magnetic disk 29, and an optical disk drive 30 for reading from or
14 writing to a removable optical disk 31 such as a CD ROM or other optical media.
15 The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are
16 connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk
17 drive interface 33, and an optical drive interface 34, respectively. Other
18 configurations might include different types of computer-readable media, such as
19 magnetic cassettes, magnetic disks, flash memory cards, and digital video disks.

20 A number of program modules may be stored on the hard disk, magnetic
21 disk 29, optical disk 31, ROM 24, or RAM 25, including an operating system 35,
22 one or more application programs 36, other program modules 37, and program
23 data 38. Microprocessor 21 is programmed by means of such components, which
24 are stored at different times in the different types of available computer-readable
25 storage media (for purposes of illustration, the program components are shown in

1 RAM in Fig. 1). The invention described herein includes these various types of
2 computer-readable storage media when such media contain instructions or
3 programs for implementing the described steps in conjunction with a
4 microprocessor or other data processor. The invention also includes the system or
5 computer itself when programmed according to the methods and techniques
6 described below.

7 The application programs of the mobile computer include a hyperlink or
8 Web browser 39. The hyperlink browser is similar to popular browsers such as
9 Microsoft's Internet Explorer. The hyperlink browser is responsive to user
10 selection of hyperlinks to send HTTP resource requests to servers and to render
11 content that is returned in response to the HTTP requests. The nature of such
12 requests and responses will be described more fully below.

13 A user may enter commands and information into the personal computer 20
14 through input devices such as a keypad or keyboard 40, a pointing device 42,
15 and/or a touch-sensitive display panel (not shown). Other input devices (not
16 shown) may include a microphone, joystick, game pad, or the like. The input
17 devices can be connected to the processing unit 21 through a serial port interface
18 46 that is coupled to the system bus, but may be connected by other interfaces,
19 such as a parallel port, game port, or a universal serial bus (USB).

20 A flat-panel monitor 47 or other type of display device is also connected to
21 the system bus 23 via an interface, such as a video adapter 48. In addition to the
22 monitor, the computer might include other peripheral output devices that are not
23 shown, such as speakers. In addition, the computer might include interfaces to
24 various automobile components such as diagnostics modules and the like.

1 Mobile computer 20 includes a positioning receiver 49 that generates
2 varying geographical coordinates indicating the varying current location of
3 computer 20 and its user. The receiver is preferably a GPS receiver and
4 communicates with processor 21 through the bus structure already described or by
5 some other conventional means such as a serial communications port.

6 Even though it is mobile, computer 20 operates in a networked environment
7 using a logical connection to one or more remote computers through a wide-area
8 network such as the public Internet. In accordance with the invention, mobile
9 computer 20 has a wireless communications interface or adapter 53 for
10 communications with a remote server over a wireless medium. Adapter 53 might
11 comprise a conventional modem in conjunction with a cellular telephone, or some
12 other type of communications adapter using digital cellular technology.

13 14 **Internet Environment**

15 Fig. 2 shows a plurality of mobile computers 20 configured to communicate
16 through the Internet with a plurality of servers or server computers 60. Each
17 server computer comprises a conventional computer such as a personal or desktop
18 computer including a processor and various types of computer-readable storage
19 media.

20 In the described embodiment, each server computer is configured as an
21 Internet or World Wide Web server. The World Wide Web (WWW or Web) of the
22 Internet is a body of hyperlinked multimedia content referred to as "hypermedia."
23 "Hypermedia" is a metaphor for information in which text, images, sounds, and
24 actions are linked together in a complex, non-sequential web of associations that
25 permit a user to "browse" or "navigate" through related topics, regardless of the

1 presented order of the topics. The term “hypermedia” arises from “hypertext,” a
2 term which was originally coined to describe text-based documents including links
3 to other such documents to form a non-sequential web of associated ideas.

4 Hypermedia content is commonly organized as individual “documents” or
5 “pages” with embedded control information. The embedded control information
6 includes formatting specifications, indicating how a document is to be rendered.
7 In addition, such control information can include links or “hyperlinks”: symbols or
8 instructions indicating where to find other related Web resources or documents
9 (files) on the Internet. A hyperlink from one hypermedia topic to another is
10 normally established by the author of a hypermedia document, although some
11 applications allow users to insert hyperlinks to desired topics.

12 A document or page often corresponds to a single file that is retrievable
13 either locally or through a network. Increasingly, however, servers compile
14 content dynamically from a variety of data sources, based on variable information
15 provided with resource requests.

16 An application program referred to as a Web browser, also referred to
17 herein as a hyperlink browser, is used to retrieve and render hypermedia content
18 from the WWW. A Web browser allows a user to browse or navigate through the
19 Web and to thereby find items of specific interest to the user. The terms “browse”
20 and “navigate” indicate a process of following a sequence of hyperlinks through a
21 plurality of different documents or other Web resources.

22 In response to activation or selection of a particular hyperlink, a Web
23 browser loads and renders the file or other multimedia content specified by the
24 hyperlink. In accordance with conventional practice, such content typically
25 contains hyperlinks to additional media resources (thus creating the “web” of

1 inter-linked documents or resources). A user can select any such hyperlink and in
2 response the Web browser will load the media resources identified by that
3 hyperlink.

4 A hyperlink is typically rendered by a Web browser as a graphical icon or
5 as highlighted keywords. A user “activates” or “follows” a hyperlink by clicking
6 on or otherwise selecting the icon or highlighted keywords. Activating a link
7 causes the Web browser to retrieve and render the document or resource that is
8 targeted by the hyperlink. The target of the hyperlink is specified in the document
9 containing the hyperlink.

10 Currently, many WWW transactions take place using a protocol referred to
11 as HTTP: hypertext transfer protocol. HTTP is an application-level protocol for
12 distributed, collaborative, hypermedia information systems. HTTP has been in use
13 by the World-Wide Web global information initiative since 1990.

14 HTTP is used to submit resource requests to network servers and to send
15 responses back to requesting clients. A resource request under HTTP specifies the
16 requested resource or Web content, as well as various other information such as
17 the HTTP version being used. An HTTP response includes the requested content
18 as well as other, optional information. More information regarding the HTTP
19 protocol can be found in a variety of published texts, such as the “Illustrated Guide
20 to HTTP,” by Paul Hethmon (ISBN 0-13-858226-2), which is hereby incorporated
21 by reference.

22 23 **Geographically-Dependent Content**

24 Servers 60 provide hyperlinked Web content on a wide-area network such
25 as the Internet. Fig. 2 shows a database 62, associated with one of the servers,

1 containing such content. In accordance with the invention, at least some of the
2 hyperlinked content is geographically-dependent. Geographically-dependent
3 content is content that is or can be tailored to be especially appropriate for users
4 that are located at a particular geographical location or within a particular
5 geographical zone. As an example, content describing restaurants is
6 geographically-dependent if it is or can be customized to show only those
7 restaurants within a defined distance of an arbitrary geographical location.

8 The servers accept HTTP resource requests from a plurality of mobile
9 computers or clients, wherein the mobile clients have locations that vary with
10 time. In response to certain types of requests, the servers select and return
11 different geographically-dependent content to the requesting clients, depending on
12 geographical coordinates specified in the HTTP resource requests.

13 Specifically, the hyperlink browser of a particular mobile computer
14 includes geographical coordinates of that mobile computer in HTTP requests made
15 by the hyperlink browser. These coordinates are embedded in the HTTP requests
16 automatically, without any intervention by a user. The coordinates are embedded
17 in the HTTP request as part of a special request-header field named
18 "GPSLocation". An example format of such a header field is as follows:

19 GPSLocation: 46.21 N, 85.30 W

20 where the first number indicates degrees of latitude and the second number
21 indicates degrees of longitude. An example of a full HTTP request in accordance
22 with the invention is as follows:

23 GET /mymap.asp HTTP/1.0
24 Host: mobile.msn.com
25 Accept: image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, */*
User-Agent: Mozilla/4.0 (compatible; MSMapper 1.0; Windows CE)
GPSLocation: 46.21 N, 85.30 W

1 This request specifies the resource “/mymap.asp” from server
2 “mobile.msn.com”. In response to any given request that includes the
3 GPSLocation field, a server can respond in any way that has been determined to
4 be appropriate. The field will be simply ignored for some resources and on some
5 servers. Other servers will have certain content or resources that are customizable
6 based on the specified geographical coordinates, and will return such customized
7 content.

8 Fig. 3 illustrates methodological aspects of the invention. The steps
9 illustrated on the left-hand side of Fig. 3 are performed by a mobile client and its
10 Web browser. The steps on the right-hand side of Fig. 3 are performed by a Web
11 server.

12 A step 300, performed by the client, comprises rendering hyperlinked Web
13 content containing one or more hyperlinks. Step 302 comprises allowing a user to
14 select a hyperlink from the rendered hyperlinked content. Step 304 comprises
15 obtaining current geographical coordinates of the mobile computer from the
16 computer’s GPS receiver. Step 306 comprises sending an HTTP request to a
17 hyperlinked content network and eventually to a server, wherein the HTTP request
18 includes the embedded GPSLocation parameters specified above.

19 Step 310, performed by a server, comprises receiving the HTTP request.
20 Step 312 comprises querying a database or performing some other procedure to
21 obtain or create content that is appropriate for the location indicated in the HTTP
22 request. Step 314 comprises returning the content to the mobile computer.

23 Step 320, performed by the mobile client, comprises receiving the content.
24 Step 322 comprises rendering the returned content.
25

1 The servers can utilized the geographic information in various ways
2 depending on the nature of the resource being requested. In many cases, the
3 geographic coordinates will be utilized to provide data about the area surrounding
4 the location of the mobile client: nearby restaurants, merchants, points of interest,
5 maps of the area, etc.

6 As another example, it is becoming quite common for servers to return a
7 host of advertising supplements in conjunction with requested content. Such
8 advertising supplements may be displayed in additional screen areas or as part of
9 the returned graphical content. In accordance with the invention, a server can be
10 configured to select such advertising supplements based on particular clients'
11 actual locations. With this type of selection, a user might therefore be exposed
12 primarily to advertisements from merchants in the general geographical area.

13 Using the techniques described above, a server can support discussions
14 regarding certain geographic locations. Users are directed to the appropriate
15 discussion depending on their current geographic locations. A server might also
16 facilitate a "chat" feature that connects various users within specified geographical
17 areas.

18 As a further feature, servers can return optional "zone" parameters with the
19 returned content, indicating geographical zones within which the returned
20 geographically-dependent content is considered valid. When displaying content
21 associated with such zone parameters, a Web browser continually monitors its
22 location and compares it to the indicated "valid zone" specified for the content.
23 When the Web browser leaves the valid zone, the browser invalidates the content.
24 More specifically, it resubmits the HTTP request that generated the content to
25 obtain new content that is appropriate for the new location of the browser.

1 A valid zone specifications is preferably specified as a radius, indicating a
2 radius from the geographical coordinates of the original HTTP request within
3 which returned geographically-dependent content is considered valid. As an
4 example, the header of an HTTP response might include the GPSLocation field
5 described above, reflecting the coordinates given in the request, and a
6 GPSValidRadius field as follows:

7 GPSLocation: 46.21 N, 85.30 W
8 GPSValidRadius: 1.6 km

9 The associated content would be valid as long as the client was within 1.6
10 km of the coordinates given by the GPSLocation field.

11 To provide privacy when desired, the Web browser allows the user to turn
12 off the features described above, so that location coordinates are not embedded in
13 HTTP requests. Furthermore, the Web browser allows a user to specify arbitrary
14 locations, independent of actual locations, that are specified in HTTP requests
15 under the GPSLocation field. This allows a user to retrieve information about a
16 specific location without really being there.

17 Conclusion

18 The invention allows GPS coordinates to be utilized without requiring
19 client computers to have dedicated application programs for using such
20 coordinates. In the past, for instance, a user needed to run a special program to
21 coordinate the use of GPS coordinates with databases of geographic-dependent
22 topics. In accordance with the invention, however, a user's browser automatically
23 inserts GPS coordinates in HTTP requests, allowing Web servers to assume
24 responsibility for customizing information based on those parameters.
25

1 Although the invention has been described in language specific to
2 structural features and/or methodological steps, it is to be understood that the
3 invention defined in the appended claims is not necessarily limited to the specific
4 features or steps described. Rather, the specific features and steps are disclosed as
5 preferred forms of implementing the claimed invention.

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